



Complete Summary

GUIDELINE TITLE

ACR Appropriateness Criteria® right upper quadrant pain.

BIBLIOGRAPHIC SOURCE(S)

Bree RL, Rosen MP, Foley WD, Gay SB, Grant TH, Heiken JP, Huprich JE, Lalani T, Miller FH, Ros PR, Sudakoff GS, Greene FL, Rockey DC, Expert Panel on Gastrointestinal Imaging. ACR Appropriateness Criteria® right upper quadrant pain. [online publication]. Reston (VA): American College of Radiology (ACR); 2007. 5 p. [16 references]

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Bree RL, Foley WD, Gay SB, Glick SN, Heiken JP, Huprich JE, Levine MS, Ros PR, Rosen MP, Shuman WP, Greene FL, Rockey DC, Expert Panel on Gastrointestinal Imaging. Right upper quadrant pain. [online publication]. Reston (VA): American College of Radiology (ACR); 2005. 5 p. [16 references]

The appropriateness criteria are reviewed annually and updated by the panels as needed, depending on introduction of new and highly significant scientific evidence.

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SCOPE

DISEASE/CONDITION(S)

Right upper quadrant pain

GUIDELINE CATEGORY

Diagnosis
Evaluation

CLINICAL SPECIALTY

Critical Care
Emergency Medicine
Family Practice
Gastroenterology
Internal Medicine
Nuclear Medicine
Radiology
Surgery

INTENDED USERS

Health Plans
Hospitals
Managed Care Organizations
Physicians
Utilization Management

GUIDELINE OBJECTIVE(S)

To evaluate the appropriateness of initial radiologic examinations for patients with right upper quadrant pain

TARGET POPULATION

Patients with right upper quadrant pain

INTERVENTIONS AND PRACTICES CONSIDERED

1. Ultrasound (US)
 - Abdomen
 - Abdomen with cholecystokinin
2. X-ray
 - Upper gastrointestinal (GI) series
 - Abdomen
 - Contrast enema
3. Computed tomography (CT), abdomen, with or without contrast
4. Nuclear medicine
 - Cholescintigraphy
 - Cholescintigraphy with cholecystokinin
5. Invasive (INV)
 - Cholangiography, percutaneous cholecystostomy
 - Endoscopic retrograde cholangiopancreatography (ERCP)

MAJOR OUTCOMES CONSIDERED

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

The guideline developer performed literature searches of peer-reviewed medical journals, and the major applicable articles were identified and collected.

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Not Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not stated

METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

One or two topic leaders within a panel assume the responsibility of developing an evidence table for each clinical condition, based on analysis of the current literature. These tables serve as a basis for developing a narrative specific to each clinical condition.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus (Delphi)

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Since data available from existing scientific studies are usually insufficient for meta-analysis, broad-based consensus techniques are needed to reach agreement in the formulation of the appropriateness criteria. The American College of Radiology (ACR) Appropriateness Criteria panels use a modified Delphi technique

to arrive at consensus. Serial surveys are conducted by distributing questionnaires to consolidate expert opinions within each panel. These questionnaires are distributed to the participants along with the evidence table and narrative as developed by the topic leader(s). Questionnaires are completed by the participants in their own professional setting without influence of the other members. Voting is conducted using a scoring system from 1 to 9, indicating the least to the most appropriate imaging examination or therapeutic procedure. The survey results are collected, tabulated in anonymous fashion, and redistributed after each round. A maximum of three rounds is conducted and opinions are unified to the highest degree possible. Eighty percent agreement is considered a consensus. This modified Delphi technique enables individual, unbiased expression, is economical, easy to understand, and relatively simple to conduct.

If consensus cannot be reached by the Delphi technique, the panel is convened and group consensus techniques are utilized. The strengths and weaknesses of each test or procedure are discussed and consensus reached whenever possible. If "No consensus" appears in the rating column, reasons for this decision are added to the comment sections.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Criteria developed by the Expert Panels are reviewed by the American College of Radiology (ACR) Committee on Appropriateness Criteria.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

ACR Appropriateness Criteria®

Clinical Condition: Right Upper Quadrant Pain

Variant 1: Fever, elevated WBC, positive Murphy sign.

Radiologic Procedure	Rating	Comments	RRL*
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Radiologic Procedure	Rating	Comments	RRL*
US abdomen	9		None
X-ray abdomen	5		Med
CT abdomen with or without contrast	5		Med
NUC cholescintigraphy	4		Low
X-ray upper GI series	3		Med
X-ray contrast enema	3		Med
<u>Rating Scale:</u> 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 2: Suspected acalculous cholecystitis.

Radiologic Procedure	Rating	Comments	RRL*
NUC cholescintigraphy	8		Low
CT abdomen with or without contrast	6		Med
X-ray abdomen	6		Med
US abdomen	4	Repeat within 24 hours	None
X-ray upper GI series	3		Med
X-ray contrast enema	3		Med
<u>Rating Scale:</u> 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 3: No fever, normal WBC.

Radiologic Procedure	Rating	Comments	RRL*
US abdomen	8		None
CT abdomen with or without contrast	7		Med
NUC cholescintigraphy	6		Low
X-ray abdomen	4		Med
X-ray contrast enema	4		Med
X-ray upper GI series	3		Med
<u>Rating Scale:</u> 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 4: No fever, normal WBC, ultrasound shows only gallstones.

Radiologic Procedure	Rating	Comments	RRL*
NUC cholescintigraphy	8		Low
CT abdomen with or without contrast	6		Med
X-ray abdomen	4		Med
X-ray contrast enema	4		Med
X-ray upper GI series	3		Med
<u>Rating Scale:</u> 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 5: Hospitalized patient with fever, elevated WBC, and positive Murphy sign.

Radiologic Procedure	Rating	Comments	RRL*
US abdomen	9		None
NUC cholescintigraphy	7		Low
CT abdomen with or without contrast	7		Med
X-ray abdomen	6		Med
NUC cholescintigraphy with cholecystokinin	6		Low
US abdomen with cholecystokinin	5		None
INV cholangiography percutaneous cholecystostomy	5	Particularly in ICU patients, this can be both diagnostic and therapeutic.	IP
X-ray contrast enema	4		Med
X-ray upper GI series	3		Med
INV ERCP	3		Med
<u>Rating Scale:</u> 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Summary of Literature Review

Acute right upper quadrant pain is a very common presenting symptom in patients presenting to hospital emergency rooms and in the occasional patient hospitalized for chronic disease or trauma. The primary diagnosis to be established in these patients is acute cholecystitis (AC) and the primary mode of treatment is laparoscopic cholecystectomy. It has been suggested empirically and by scientific evidence that approximately one-third of patients with presumptive diagnosis of AC will not be confirmed as AC on follow-up. Of patients who have surgery for AC, 20% to 25% may have a different diagnosis. These studies, of

course, were primarily performed in the era before modern imaging. Additionally, because there are data indicating that surgery in AC leads to better outcomes, there is preference among surgeons to make a diagnosis based on the presence of gallstones and clinical findings and to perform early laparoscopic cholecystectomy. In fact, it might be necessary to redefine the patient outcomes of AC rather than rely on strict histologic criteria when, in the early stages of the disease, the histologic abnormalities may be minimal. In the otherwise healthy patient, imaging intervention may be only minimally necessary, but in more complicated patients a more complex protocol might be appropriate.

The evidence-based diagnosis of AC was studied in a meta-analysis published in 2003. No clinical or laboratory finding had a high or low enough likelihood ratio to predict its presence or absence. This study further supports the evidence that imaging studies are essential for the diagnosis. Much of the literature defining the role of imaging studies in evaluating patients with acute right upper quadrant pain is from the 1980s. When ultrasound (US) began to be used for these patients, it became obvious that it was destined to replace intravenous cholangiography and oral cholecystography for gallbladder evaluation. An initial study in 1981 defined the sonographic Murphy sign as focal gallbladder tenderness, which, along with sludge and gallbladder thickening, enabled physicians to separate acute from chronic cholecystitis in patients who harbored stones. Unfortunately, the sonographic Murphy sign does have a low specificity for AC.

In 1982, a study of the accuracy of scintigraphy with hepato-iminodiacetic acid (HIDA) compared with sonography indicated similar excellent results in 91 patients suspected of having AC. The overall accuracy of US was 88%, and for scintigraphy, it was 85%.

A study of 194 patients published in 1983 using strict criteria for pathologic diagnosis of AC and liberal criteria for US diagnosis (presence of stones) showed that, when scintigraphy was compared with US, sensitivities were high for both but specificity of US dropped to 64% with a positive predictive value of only 40%. The sonographic Murphy sign was not analyzed, nor was there correlation with clinical data.

Since these studies, other scattered articles in the radiologic literature have debated the role of US and scintigraphy in the diagnosis of AC. One criticism of scintigraphy is the time to perform the study (up to 4 hours to separate acute from chronic cholecystitis). The time can be diminished with the use of intravenous (IV) morphine, but the yield in otherwise healthy patients may not be significant because they will have the same outcome, a laparoscopic cholecystectomy. Some may argue that AC should be defined by the relief of symptoms following cholecystectomy. Authors often recommend US or scintigraphy, or both, for diagnosing AC; however, it is accepted that scintigraphy continues to have higher sensitivity and specificity than US. The role of scintigraphy remains for the individual surgeon or emergency physician to determine in an individual case.

Complications of AC include gangrene, empyema, and perforation. The sonographic Murphy sign may be absent when gangrenous AC is present, and other features such as pericholecystic fluid, gallbladder wall thickening, and dilated gallbladder are important in this group of patients.

With the routine use of laparoscopic cholecystectomy, the importance of preoperative or intraoperative detection of nonobstructing, asymptomatic common duct stones remains controversial. Common duct stones are present in 10% to 20% of patients with AC. One approach to predicting common duct stones uses the size of the gallstones present, with patients having multiple stones less than 5 mm in diameter more likely to have common duct stones than those with multiple larger stones or single large stones. In patients at higher risk for common duct stones, preoperative study with endoscopic retrograde cholangiopancreatography (ERCP) may be warranted.

The patient with acalculous cholecystitis is more problematic. The use of sonography and scintigraphy has been advocated, including using cholecystokinin to attempt to evaluate gallbladder contraction. The absence of stones, particularly in the patient presenting to the emergency room, should be confirmed with a follow-up examination if symptoms persist. Otherwise, acalculous cholecystitis seen in hospitalized patients as well as in a small percentage of patients presenting to the emergency room may be a diagnosis of exclusion. Computed tomography (CT) has a role in evaluating these critically ill patients. In the patient in the intensive care units, several centers perform percutaneous cholecystostomies. Others are less aggressive, or cholecystostomies are performed surgically.

Other clinical conditions that can simulate AC and present with acute right upper quadrant pain include chronic cholecystitis, peptic ulcer, pancreatitis, gastroenteritis, bowel obstruction, and many others. In this group of patients, CT and barium studies of the upper and lower gastrointestinal tract can be useful to identify alternative diagnoses.

In summary, the diagnosis of AC can often be made clinically with confirmation of gallstones necessary to confirm the need for laparoscopic cholecystectomy. A study has yet to be performed that relates cholecystectomy performed with this scenario to patient outcomes. Scintigraphy costs more, takes longer, and gives higher sensitivity and specificity than ultrasound, but it cannot contribute to a diagnosis if the etiology is not within the biliary tract. False positives can occur in patients with high bilirubin levels and severe intercurrent illnesses. False negatives are rare in AC. These guidelines should allow the radiologist, emergency physician, and surgeon to be comfortable in choosing an expedient modality or combination of modalities to make this important diagnosis.

Abbreviations

- CT, computed tomography
- ERCP, endoscopic retrograde cholangiopancreatography
- GI, gastrointestinal
- ICU, intensive care unit
- INV, invasive
- IP, in process
- Med, medium
- NUC, nuclear medicine
- US, ultrasound
- WBC, white blood cell

Relative Radiation Level*	Effective Dose Estimated Range
None	0
Minimal	<0.1 mSv
Low	0.1-1 mSv
Medium	1-10 mSv
High	10-100 mSv
*RRL assignments are not included for some examinations. The RRL assignments for the IP (in progress) exams will be available in future releases.	

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The recommendations are based on analysis of the current literature and expert panel consensus.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Selection of appropriate radiologic imaging procedures for evaluation of patients with right upper quadrant pain

POTENTIAL HARMS

Scintigraphy may render false positive or false negative (rarely) results.

Relative Radiation Level (RRL)

Potential adverse health effects associated with radiation exposure are an important factor to consider when selecting the appropriate imaging procedure. Because there is a wide range of radiation exposures associated with different diagnostic procedures, a relative radiation level (RRL) indication has been included for each imaging examination. The RRLs are based on effective dose, which is a radiation dose quantity that is used to estimate population total radiation risk associated with an imaging procedure. Additional information regarding radiation dose assessment for imaging examinations can be found in the American College of Radiology (ACR) Appropriateness Criteria® Radiation Dose Assessment Introduction document (see "Availability of Companion Documents" field).

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

An American College of Radiology (ACR) Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists, and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those exams generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the U.S. Food and Drug Administration (FDA) have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

IMPLEMENTATION TOOLS

Personal Digital Assistant (PDA) Downloads

For information about [availability](#), see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Bree RL, Rosen MP, Foley WD, Gay SB, Grant TH, Heiken JP, Huprich JE, Lalani T, Miller FH, Ros PR, Sudakoff GS, Greene FL, Rockey DC, Expert Panel on Gastrointestinal Imaging. ACR Appropriateness Criteria® right upper quadrant pain. [online publication]. Reston (VA): American College of Radiology (ACR); 2007. 5 p. [16 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

1996 (revised 2007)

GUIDELINE DEVELOPER(S)

American College of Radiology - Medical Specialty Society

SOURCE(S) OF FUNDING

The American College of Radiology (ACR) provided the funding and the resources for these ACR Appropriateness Criteria®.

GUIDELINE COMMITTEE

Committee on Appropriateness Criteria, Expert Panel on Gastrointestinal Imaging

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Panel Members: Robert L. Bree, MD, MHSA; Max Paul Rosen, MD, MPH; W. Dennis Foley, MD; Spencer B. Gay, MD; Thomas H. Grant, DO; Jay P. Heiken, MD; James E. Huprich, MD; Tasneem Lalani, MD; Frank H. Miller, MD; Pablo R. Ros, MD, MPH; Gary S. Sudakoff, MD; Frederick L. Greene, MD; Don C. Rockey, MD

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

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The appropriateness criteria are reviewed annually and updated by the panels as needed, depending on introduction of new and highly significant scientific evidence.

GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the [American College of Radiology \(ACR\) Web site](#).

ACR Appropriateness Criteria® *Anytime, Anywhere*™ (PDA application). Available from the [ACR Web site](#).

Print copies: Available from the American College of Radiology, 1891 Preston White Drive, Reston, VA 20191. Telephone: (703) 648-8900.

AVAILABILITY OF COMPANION DOCUMENTS

The following are available:

- ACR Appropriateness Criteria®. Background and development. Reston (VA): American College of Radiology; 2 p. Electronic copies: Available in Portable Document Format (PDF) from the [American College of Radiology \(ACR\) Web site](#).
- ACR Appropriateness Criteria® radiation dose assessment introduction. American College of Radiology. 2 p. Electronic copies: Available from the [American College of Radiology Web site](#).

PATIENT RESOURCES

None available

NGC STATUS

This summary was completed by ECRI on March 19, 2001. The information was verified by the guideline developer on March 29, 2001. This summary was updated by ECRI on March 28, 2006. This summary was updated by ECRI Institute on June 24, 2009.

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